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REACTOR - THERMAL EMISSION CONVERTER, (U)  
MAY 78 N N KAVTARADZE, Y V KUZNETSOV

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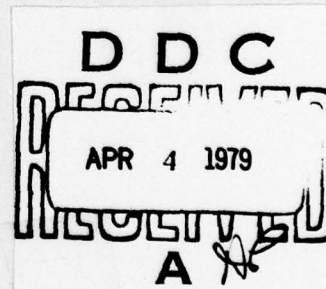
# FOREIGN TECHNOLOGY DIVISION



REACTOR - THERMAL EMISSION CONVERTER

By

N. N. Kavtaradze, Ye. V. Kuznetsov and Yu. I. Sheptor



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# EDITED TRANSLATION

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By: N. N. Kavtaradze, Ye. V. Kuznetsov and  
Yu. I. Sheptor

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# U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<b><i>А а</i></b>	A, a	Р р	<b><i>Р р</i></b>	R, r
Б б	<b><i>Б б</i></b>	B, b	С с	<b><i>С с</i></b>	S, s
В в	<b><i>В в</i></b>	V, v	Т т	<b><i>Т т</i></b>	T, t
Г г	<b><i>Г г</i></b>	G, g	У у	<b><i>У у</i></b>	U, u
Д д	<b><i>Д д</i></b>	D, d	Ф ф	<b><i>Ф ф</i></b>	F, f
Е е	<b><i>Е е</i></b>	Ye, ye; E, e*	Х х	<b><i>Х х</i></b>	Kh, kh
Ж ж	<b><i>Ж ж</i></b>	Zh, zh	Ц ц	<b><i>Ц ц</i></b>	Ts, ts
З э	<b><i>З э</i></b>	Z, z	Ч ч	<b><i>Ч ч</i></b>	Ch, ch
И и	<b><i>И и</i></b>	I, i	Ш ш	<b><i>Ш ш</i></b>	Sh, sh
Й й	<b><i>Й й</i></b>	Y, y	Щ щ	<b><i>Щ щ</i></b>	Shch, shch
К к	<b><i>К к</i></b>	K, k	Ъ ъ	<b><i>Ъ ъ</i></b>	"
Л л	<b><i>Л л</i></b>	L, l	Ы ы	<b><i>Ы ы</i></b>	Y, y
М м	<b><i>М м</i></b>	M, m	Ь ь	<b><i>Ь ь</i></b>	'
Н н	<b><i>Н н</i></b>	N, n	Э э	<b><i>Э э</i></b>	E, e
О о	<b><i>О о</i></b>	O, o	Ю ю	<b><i>Ю ю</i></b>	Yu, yu
П п	<b><i>П п</i></b>	P, p	Я я	<b><i>Я я</i></b>	Ya, ya

\*ye initially, after vowels, and after Ъ, ь; e elsewhere.  
When written as ё in Russian, transliterate as yë or ë.

## RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh <sup>-1</sup>
cos	cos	ch	cosh	arc ch	cosh <sup>-1</sup>
tg	tan	th	tanh	arc th	tanh <sup>-1</sup>
ctg	cot	cth	coth	arc cth	coth <sup>-1</sup>
sec	sec	sch	sech	arc sch	sech <sup>-1</sup>
cosec	csc	csch	csch	arc csch	csch <sup>-1</sup>

Russian	English
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rot	curl
lg	log



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## REACTOR - THERMAL EMISSION CONVERTER

N. N. Kavtaradze, Ye. V. Kuznetsov and Yu. I. Sheptor.

The invention pertains to the field of production of electrical energy and can be used in energy devices, converting energy of nuclear decay directly into electric with the aid of thermal emission converters.

There are known thermal emission converters (TEP), operating in the active zone of an atomic reactor with vapors of active metals, having a cylindrical cathode, heated by an ampoule with nuclear fuel, and a cylindrical anode, where the cathode and anode are connected together by corrugated sections. However, in the known thermal emission converters there occurs considerable loss of power, caused by shunting current, flowing through the all-metal shell of the instrument.

The purpose of the invention is the creation of a thermal

emission converter with raised efficiency and active volume.

In the proposed converter each corrugated section is made from a ring in the form of a bank of thermoelements, connected together in series so that their burning junctions are in contact with the hot zone of the converter, and cold - with the cold zone, where the emf of the thermopile has opposite direction of the emf of the converter.

In the drawing is represented the proposed thermal emission converter and cathode of the instrument adjacent to it, longitudinal view.

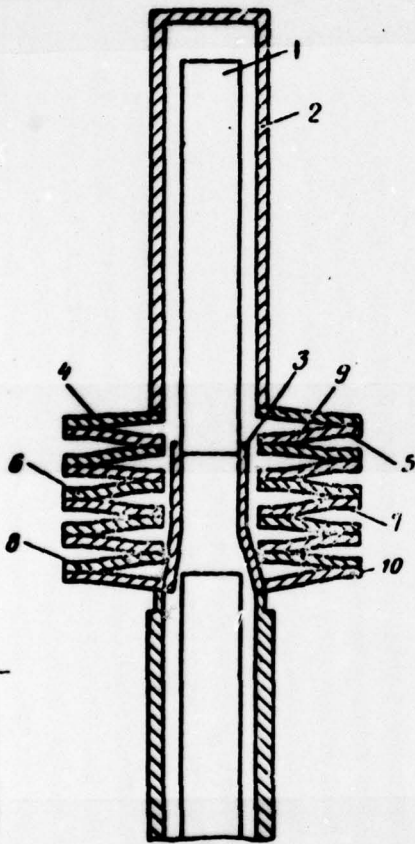


Figure.

Cathode 1 with nuclear fuel is coaxially arranged inside anode 2. The series connection of two adjacent instruments is accomplished by commutation connection 3, connecting the anode of one TEP with the cathode of the adjacent. Between the anodes of the two adjacent



instruments is placed a metal corrugated pipe 4, consisting of even (6, 8 etc.) and odd (5, 7 etc.) rings, having round sealed welding at places 9 and 10, accomplished by diffusion method or electron beam. Each pair of rings (even and odd) represents a corrugation and is the thermoelement. The thermopile, depicted on the drawing, consists of several series connected thermoelements. The external junctions of the corrugations contact the cooling system of TEP through internal insulation coating ( $\text{BeO}$ ,  $\text{Al}_2\text{O}_3$  and others), and internal - the working volume of TEP, therefore on the junctions of thermopile appears a large temperature drop (500-1000°C). With the appropriate selection of materials for rings of corrugations, compatible with plasma medium (molybdenum, ferronickel alloys etc.) the thermal column will be the source of emf.

The converter operates in the following manner.

When the thermopile is turned on toward the emf of TEP, with equality of voltages of TEP and thermopile, and also with the presence of load in the circuit of the thermal emission converter, connected in parallel to the resistance of the shell of TEP, the total current, flowing through the shell will be equal to zero. The allowable calculated current, flowing through the shell, can be set by changing the resistance of the corrugated part of the shell of TEP due to change of its dimensions or the value of counter thermal emf.



In the last case the corrugated part of the shell will occupy an insignificant portion of the volume of TEP, thereby increasing its active volume. The output voltage, created by each pair of rings with temperature drop  $100^{\circ}\text{C}$ , comprises approximately around 4 mV.

Object of invention.

Reactor - thermal emission converter, containing cylindrical cathodes with ampoules with nuclear fuel placed inside, cylindrical anodes, embracing the cathodes and connected together by corrugated sections, is distinguished by the fact that for raising the efficiency and active volume, each corrugated section is made of rings in the form of a bank of thermoelements, connected together in series so that their hot junctions are in contact with the hot zone of the converter, and cold - with the cold zone, where the emf of the thermopile has opposite direction to emf of converter.

~~SECRET~~

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		NIA/PHS	1
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*Roller*

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